



3055 BA SANGAM COLLEGE

PH: 6674003/9264117 E-mail: basangam@connect.com.fj



Worksheet 22

School: Ba Sangam College

Year/Level: 11

Subject: Physics

Strand	P11.7 Electrostatics
Sub Strand	P11.7.1 Charge
Content Learning Outcome	P11.7.1 Learn and apply the concepts of electrostatic charge

Charging an Electroscope

An electroscope can be charged by

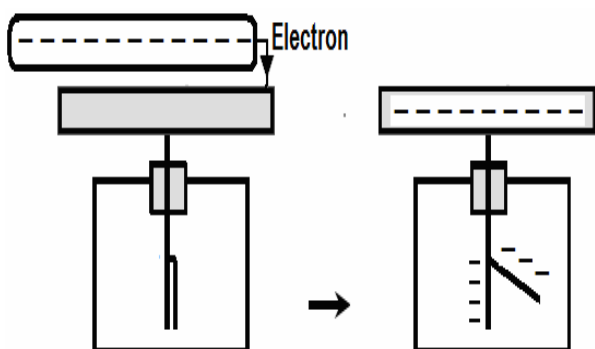
- Contact
- Induction

1. Contact Method

When charging an electroscope by contact method, an actual contact is made with the body and the cap of the electroscope. Some charges are lost by contact method.

Example 1

The following diagram shows a negatively charged rod in contact with the cap of a neutrally charged electroscope.



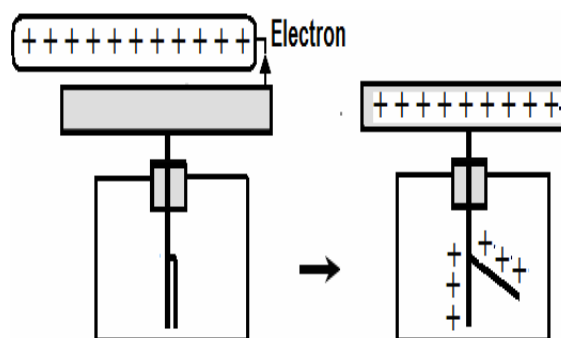
- The excess electrons move to the cap of the electroscope and then redistribute to other parts of the electroscope.
- This results in the deflection of the leaf.
- Immediately after the leaf is deflected, the contact between the cap of the electroscope and charged rod is broken.

- The electroscope is now negatively charged.
- Even though the electroscope is negatively charged, it still has few protons but they are out totally outnumbered by the electrons.
- In any charged electroscope, the opposite charge is still present but much lower in number.

Positively charged rod in contact with a neutral electroscope

Example 2

The following diagram shows a positively charged rod in contact with the cap of a neutrally charged electroscope.



- The electrons in the leaf of the electroscope are attracted to the cap and then to the positively charged rod.
- This means there are more protons in the electroscope which results in the repulsion of the leaves. The electroscope is now positively charged.

2. Induction

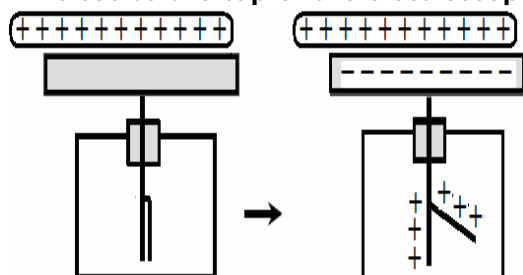
Charging electroscopes by induction does not require any contact. Induction is the efficient way of charging an electroscope because no charge is lost. Four steps are involved in charging an electroscope by induction:

- Bring the charged material close to the cap of the electroscope
- Earth the cap of the electroscope
- Break the earth contact
- Remove the charge body from the cap of the electroscope

Example

Explain how to negatively charge an electroscope by induction method.

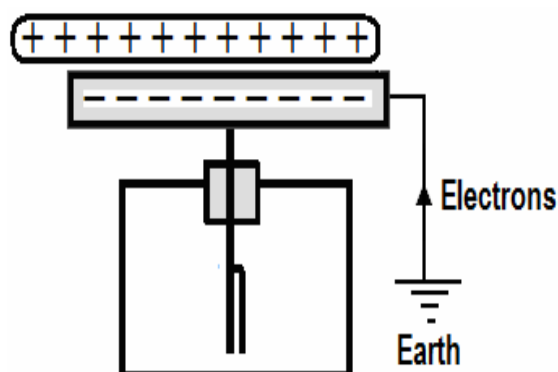
1. Bring a positively charged material close to the cap of the electroscope



In the above diagram, a positively charged rod is brought close to the cap of a neutral electroscope.

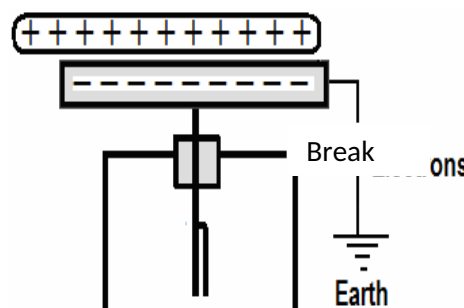
Electrons from the leaf move up to the cap of the electroscope and hence, making the leaf to repel because of the presence of more protons than electrons.

2. Earth the cap of the electroscope

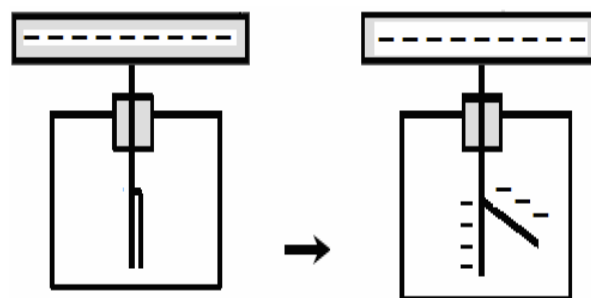


Electrons from the ground move up to the cap of the electroscope because of the attraction from the positively charged rod. The excess electrons redistribute and as a result, the leaf collapses.

3. Break the earth contact.



4. Remove the charge body from the cap of the Electroscope



Once the charged body that was near the cap of the electroscope is removed, the excess negative charges on the cap redistribute to all parts of the electroscope. This results in the repulsion of the leaves because negative charge is in dominance. The above steps are used to negatively charge an electroscope using the process called induction. Note that when a positively charged rod is brought close to the cap of the electroscope to charge the electroscope by induction, the electroscope overall acquires negative charge. Charging by induction gives opposite charge of the rod to the electroscope. In the induction process a positively charged rod when brought near the cap of a neutral electroscope, the electroscope will acquire negative charge. If a negatively charged rod is brought close to the cap of the electroscope, the electroscope will acquire positive charge.

ACTIVITY QUESTIONS (5
marks)

Explain how to positively charge an electroscope by induction method.

THE END